

ABSTRACT OF THE DISCLOSURE

5 A semiconductor source of emission electrons which uses a target
of a wide bandgap semiconductor having a target thickness
measured from an illumination surface to an emission surface.
The semiconductor source is equipped with an arrangement for
producing and directing a beam of seed electrons at the
illumination surface and a mechanism for controlling the energy
of the seed electrons such that the energy of the seed electrons
10 is sufficient to generate electron-hole pairs in the target. A
fraction of these electron-hole pairs supply the emission
electrons. Furthermore, the target thickness and the energy of
the seed electrons are optimized such that the emission
electrons at the emission surface are substantially thermalized.
The emission of electrons is further facilitated by generating
negative electron affinity at the emission surface. The source
of the invention can take advantage of diamond, AlN, BN, $\text{Ga}_{1-y}\text{Al}_y\text{N}$
and $(\text{AlN})_x(\text{SiC})_{1-x}$, wherein $0 \leq y \leq 1$ and $0.2 \leq x \leq 1$ and other wide
bandgap semiconductors.